Electronic Physician (ISSN: 2008-5842) http://www.ephysician.ir
January 2018, Volume: 10, Issue: 1, Pages: 6148-6152, DOI: http://dx.doi.org/10.19082/6148

Lead concentration in the muscles of slaughtered buffalos in northwest regions of Iran

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Type of article: Original

Abstract

Background: The topic of food safety has become a major public health issue worldwide. Over recent decades, the growing concern for food safety has brought about greater research regarding the risks associated with the consumption of produce that has been contaminated by pesticides, heavy metals and/or toxins.

Objective: The study was conducted to determine the concentration of Pb in the muscle of buffalos slaughtered in the northwest regions of Iran (Ardabil, Urmia and Tabriz cities).

Methods: The present was a descriptive cross-sectional study in the northwest regions of Iran during 2013 to 2014. A total of 30 muscle samples from individual buffalos were analyzed for Pb concentrations using Atomic Absorption Spectrophotometer (ASS). Statistical analysis was performed using SPSS 17.0. All results were computed as mean standard deviation and subjected to one-way analysis of variance to establish whether the differences in Pb concentrations in meat samples from different cities were significant or not. The Statistical significance was determined at $p<0.05$.

Results: The results showed that the mean concentration of Pb in muscle samples were measured 0.043±0.035 ppm. The highest Pb concentration (0.11 ppm) was detected in the buffalo muscle samples from Urmia city. In total, 25 muscle samples (80.33%) were contaminated with Pb and concentration of Pb in 3.33% of contaminated samples exceeded the permissible limits advised by the European Commission (EC) (0.1 ppm).

Conclusion: We recommend identifying Pb sources in order to eliminate or control Pb contamination of food, and monitor environmental exposures and hazards to prevent lead poisoning.

Keywords: Buffalo, Muscles, Pb, Atomic Absorption Spectrophotometer, Iran

1. Introduction

Although there is great concern for food-borne illnesses caused by consumption of produce contaminated with microorganisms and/or their toxins, there are additional health hazards from produce contaminated with other toxins, including fungal toxins and heavy metals that could also lead to acute poisoning and long-term health problems (1). Attention to the ramifications associated with heavy metal contamination is of the utmost concern. In general, heavy metals are nonbiodegradable, having extensive biological half-lives and the potential to accumulate in different body organs, which can ultimately lead to unwanted side effects (2-4). Several studies have indicated that heavy metals, such as Cd, Pb, and Cr, have the ability to accumulate in the muscles of many animals such as cows, sheep and buffalos (5-7). The findings of Massanyi et al. confirmed that Cd and Pb have the ability of accumulation in sheep muscles, but concentration of heavy metals in the muscles are lower in comparison with

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Received: May 09, 2017, Accepted: August 20, 2017, Published: January 2018
iThenticate screening: August 21, 2017, English editing: January 14, 2018, Quality control: January 15, 2018
This article has been reviewed / commented by three experts